

Rapid Watershed Assessment

Clearwater-Elk

(MN) HUC: 07010203



Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

Introduction

The Clearwater-Elk 8-Digit Hydrologic Unit Code (HUC) subbasin is located within the North Central Hardwood Forest Ecoregion of Minnesota, and includes many of the conifer and hardwood forest types associated with the region. Approximately ninety percent of the 717,785 acres in this HUC are privately owned. The remaining acres are federal, state or county owned land or held by corporate interests.

Assessment estimates indicate 2,250 Farms in the watershed.

Approximately forty nine percent of the operations are less than 180 acres in size, forty seven percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Of the 2,287 Operators in the basin, fifty eight percent are full-time producers not reliant on off-farm income.

The main resource concerns in the watershed are water and soil quality, animal waste management, stormwater management, wetland management, groundwater quality and quantity and groundwater protection.

Many of the resource concerns relate directly to agricultural practices and increased development in the region, resulting in fragmentation and increased sediment and pollutant (mercury, fecal coliform, phosphorus, excess nutrients) loadings to surface waters.



County Totals

County	Acres in HUC	% HUC
Morrison	168	0.01%
Mille Lacs	10,940	1.5%
Benton	177,639	24.7%
Stearns	106,996	14.9%
Sherburne	257,534	35.9%
Wright	134,607	18.8%
Meeker	29,900	4.2%
Hennepin	0.001	0.0%
Total acres:	717,785	100%



Physical Description

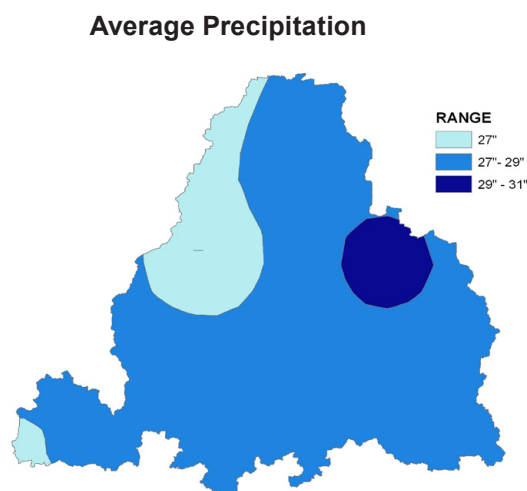
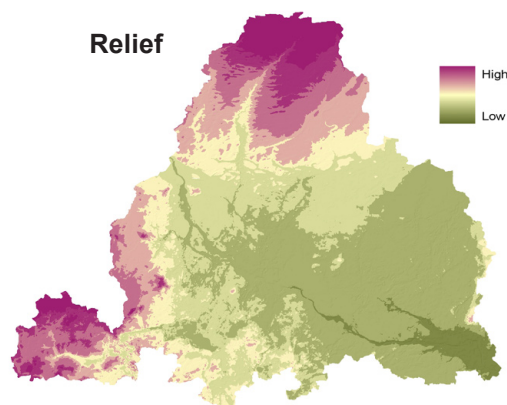
Elevations in the Clearwater-Elk watershed range from 1020 feet above mean sea level near Sauk Rapids in the Northwest, sloping to elevations of 940 feet near the towns of Elk River and Big Lake in the Southeast.

Precipitation in the watershed ranges from 27 to 31 inches each year. Evaporation estimates are between 36 to 37 inches annually (Minnesota State Climatologists Office, 1999).

Most lands within this HUC are not highly erodible, and are moderately to well suited to agricultural uses. Predominate land uses / land covers are Row Crops (39%), Grass/Pasture/Hay (22.6%), Forest (18.2%) , and Residential/Commercial Development (8.4%).

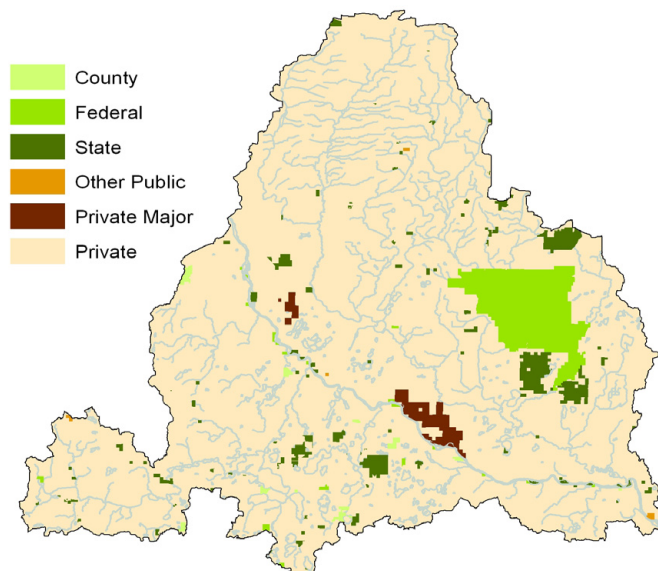
Land use within the watershed is largely agricultural, with crop and pasture lands accounting for approximately 62% of the overall watershed acres.

Development pressure is moderate to considerable in some areas, with occasional farms, timberland, and lakeshore being parceled out for recreation, lake or country homes and expanding suburban populations.



Ownership

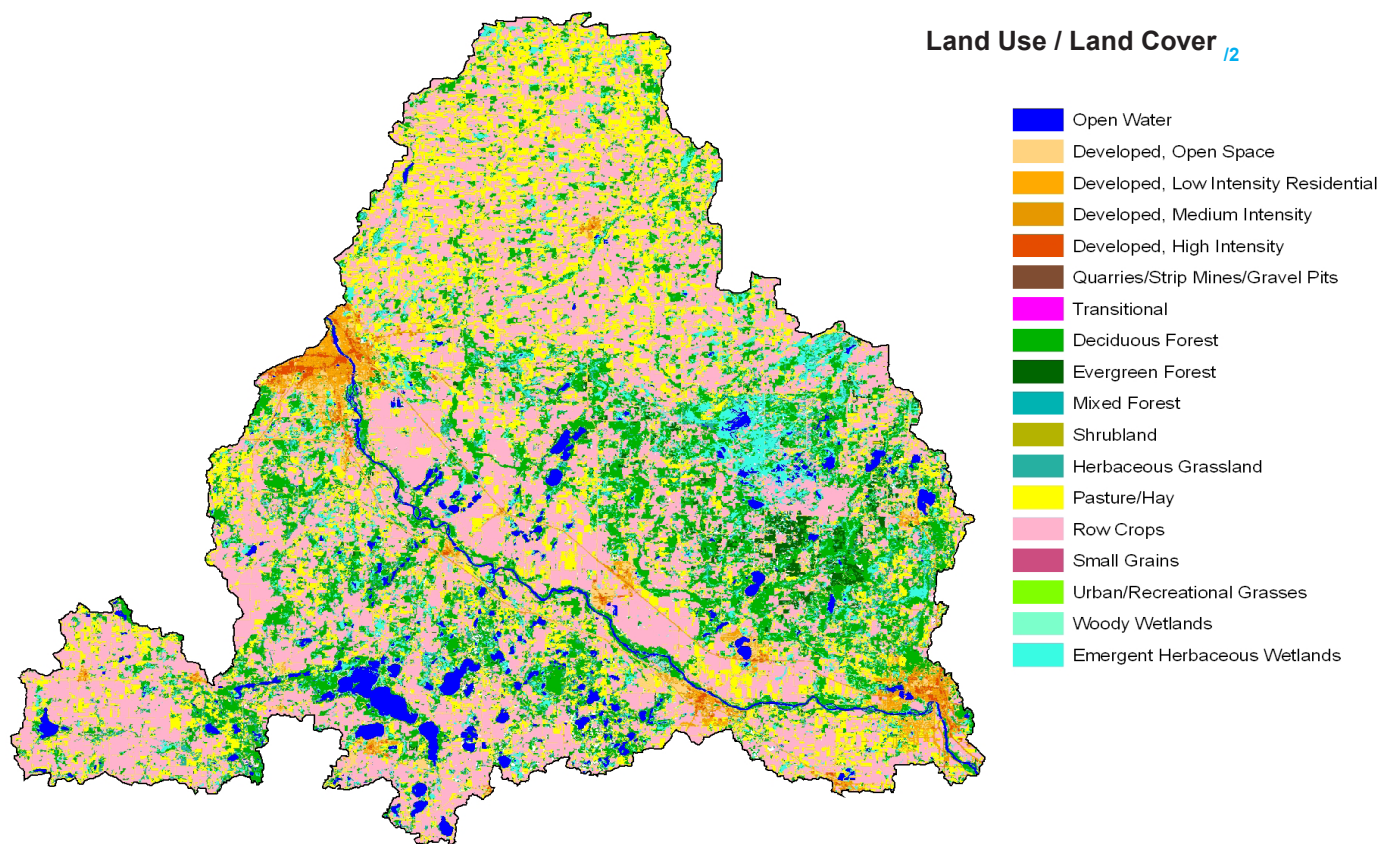
Ownership Type	Acres	% of HUC
Conservancy	-	-
County	2,188	0.3
Federal	48,539	6.8
State	17,646	2.5
Other	372	0.1
Tribal	-	-
Private Major	6,478	0.9
Private	642,562	89.5
Total Acres:	717,785	100



* Ownership totals derived from 2007 MN DNR GAP Stewardship Coverage data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Clearwater-Elk watershed covers an area of 717,785 acres. Slightly less than ninety percent of the land in the watershed is owned by private landholders (642,562 acres). The second largest ownership type is Federal, with approximately 48,539 acres (6.8%), followed by State with 17,646 acres (2.5%), Private Major with 6,478 acres (0.9), and County with 2,188 acres (0.3%), and there are an additional 372 acres of miscellaneous "Other" Public lands. Existing ownership data shows no major Tribal or Conservancy land holdings in the region. Land use by ownership type is represented in the table below.



Ownership / Land Use ^{/3}

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	17,572	2.4%	113,268	15.8%	0	0.0%	130,839	18.2%
Grass, etc	7,340	1.0%	154,913	21.6%	0	0.0%	162,253	22.6%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	9,352	1.3%	270,672	37.7%	0	0.0%	280,023	39.0%
Shrub etc	892	0.1%	5,309	0.7%	0	0.0%	6,202	0.9%
Wetlands	12,545	1.7%	39,257	5.5%	0	0.0%	51,802	7.2%
Residential/Commercial	1,531	0.2%	58,460	8.1%	0	0.0%	59,991	8.4%
Open Water*	2,705	0.4%	23,972	3.3%	0	0.0%	26,677	3.7%
Watershed Totals:	51,935	7.24%	665,852	92.8%	0	0.0%	717,785	100%

* ownership undetermined

** includes private-major

Physical Description (continued)

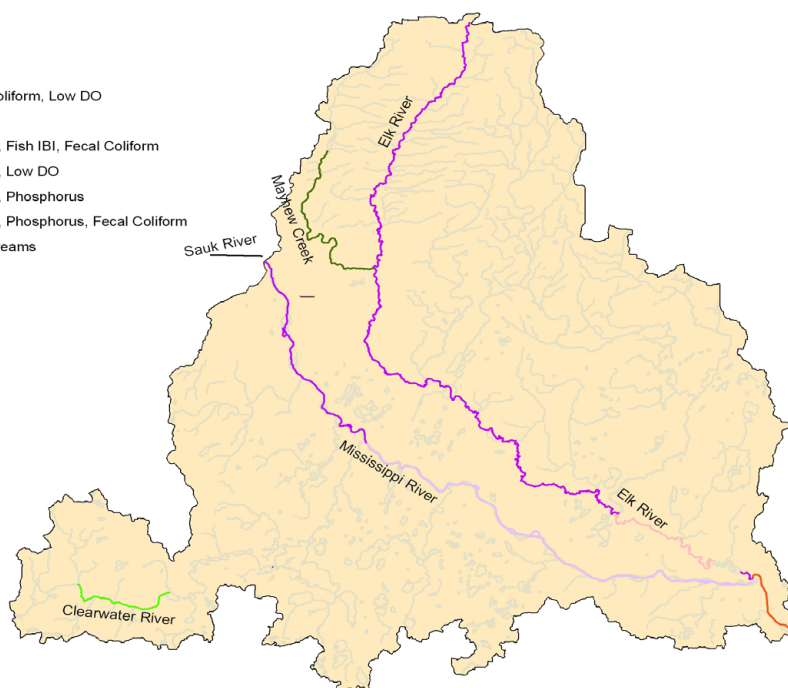
		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN	Total Avg.	5,633	
		May – Sept. Yield	21,530	
Stream Data ¹⁴ (*Percent of Total HUC Stream Miles)		ACRES/MILES	PERCENT	
	Total Miles – Major (100K Hydro GIS Layer)	1,425.7	---	
	303d/TMDL Listed Streams (DEQ)	152.1	10.7%	
Riparian Land Cover/Land Use ¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Forest	8,634	25.5%	
	Grain Crops	0	0.0%	
	Grass, etc	6,451	19.1%	
	Orchards	0	0.0%	
	Row Crops	5,634	16.6%	
	Shrub etc	306	0.9%	
	Wetlands	5,807	17.2%	
	Residential/Commercial	1,265	3.7%	
	Open Water	5,744	17.0%	
	Total Buffer Acres:	33,841	100%	
Crop and Pastureland Land Capability Class ¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	2,600	1%	
	2 – moderate limitations	125,800	36%	
	3 – severe limitations	91,900	26%	
	4 – very severe limitations	103,700	29%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	25,400	7%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	3,200	1%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%	
	Total Croplands & Pasturelands	352,600	---	
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands ¹⁷ (2002 NASS Figures)	Cultivated Cropland / Pastureland	49,117	13.9%	6.8%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	49,117	13.9%	6.8%

Assessment of Waters

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

2006 Minnesota 303d Listed Streams - Clearwater-Elk Watershed

- Fish IBI
- Fecal Coliform, Low DO
- Mercury
- Mercury, Fish IBI, Fecal Coliform
- Mercury, Low DO
- Mercury, Phosphorus
- Mercury, Phosphorus, Fecal Coliform
- 100k Streams



Listed Stream / Reach ⁶⁸	Impairment	Affected Use
Mississippi River; Sauk R to St. Cloud Dam	Mercury	Aquatic Consumption
Clearwater River; CD 44 to Lk Betsy	Fecal Coliform, Low DO	Aquatic Life and Aquatic Recreation
Mississippi River; Elk R to Crow R	Mercury, Phosphorus	Aquatic Consumption
Elk River; St. Francis R to Orono Lake	Mercury, Low DO	Aquatic Life and Aquatic Consumption
Elk River; Rice Cr to St. Francis R	Mercury	Aquatic Consumption
Elk River; Mayhew R to Rice Cr	Mercury	Aquatic Consumption
Elk River; Headwaters to Mayhew Cr	Mercury	Aquatic Consumption
Mayhew Creek; Headwaters (Mayhew Lk) to Elk R	Fish IBI	Aquatic Life
Mississippi River; Clearwater R to Elk R	Mercury, Fish IBI, Fecal Coliform	Aquatic Life, Recreation, Consumption
Mississippi River; St. Cloud Dam to Clearwater R	Mercury	Aquatic Consumption
Elk River; Orono Lk to Mississippi R	Mercury	Aquatic Consumption
Elk River; Rice Cr to St. Francis R	Mercury	Aquatic Consumption
Sauk River; Mill Cr to Mississippi R	Mercury, Phosphorus, Fecal Coliform	Aquatic Recreation, Consumption
Mississippi River; Watab R to Sauk R	Mercury	Aquatic Consumption

Assessment of Waters (continued)

2006 Minnesota 303d Listed Lakes - Clearwater-Elk



Listed Lake	Impairment	Affected Use
Mayhew	Mercury	Aquatic Consumption
Orono	Mercury	Aquatic Consumption
Birch	Excess nutrients	Aquatic Recreation
Silver	Mercury	Aquatic Consumption
Locke	Excess nutrients	Aquatic Recreation
Cedar	Mercury	Aquatic Consumption
Pleasant	Mercury	Aquatic Consumption
Clearwater	Mercury	Aquatic Consumption
Louisa	Excess nutrients	Aquatic Recreation

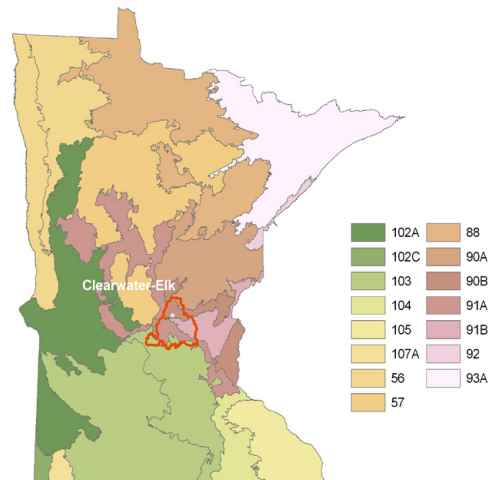
Common Resource Areas

Clearwater-Elk encompasses five common resource areas, 103.2, 91A.1, 91B.1, 90A.1 and 90B.1. ^{/9}

103.2 Iowa and Minnesota Rolling Prairie/Forest Moraines: Primarily loamy glacial till soils with some potholes, outwash and flood plains. Gently undulating to rolling with relatively short, complex slopes. Organic soils occur in the larger basins. Primary land use is cropland. Corn, soybeans, and hay are the major crops. Native vegetation was dominantly mixed tall grass prairie and deciduous trees. Resource concerns are water and wind erosion, nutrient management, water quality & wildlife habitat management.

91A.1 Central Minnesota Outwash: Nearly level to gently sloping well drained sandy soils on outwash plains and stream terraces. There are also numerous poorly and very poorly drained mineral and organic soils. Irrigated crop land, pasture and hayland are the major land uses. Forestland is common in parts. Corn, soybeans, edible beans and potatoes are the primary irrigated crops. Forage crops are also extensively grown. Resource concerns are wind erosion water quality, nutrient management, improperly managed grazing.

91B.1 Anoka Sand Plain and Northwest Wisconsin Outwash: Gently sloping to moderately steep outwash plains and moraines. Soils range from excessively drained sandy soils to very poorly drained organic soils. Mostly deciduous and coniferous forestland, pasture with more cropland in the western part. The primary resource concerns are forestland productivity, erosion control on cropland and timbered areas during harvest, upland wildlife habitat management, and recreation.



Only the major CRA units are described above.
 For further information, go to:
<http://soils.usda.gov/survey/geography/cra.html>

90A.1 Loamy Till Ground Moraines and Drumlins: Nearly level to moderately steep, loamy, sandy, and organic soils. Mixed deciduous and coniferous forest is the primary land use with some glacial lakes and wetlands. Scattered cropland and grazing land are present. Cropland productivity is limited by the short length of the growing season. Primary resource concerns are timber management, wildlife habitat, recreation and agricultural forage production. Surface water quality is a localized concern.

90B.1 Dense Till Ground Moraine: Nearly level and gently sloping moderately well and somewhat poorly drained loamy soils underlain by loamy glacial residuum and bedrock. Mostly cropland and grazing land, with areas of mixed deciduous and coniferous forest, wetlands, and a few lakes. Dairy and beef production with some cash grain are the primary agricultural enterprises. Primary resource concerns include nutrient management, cropland soil erosion, grazing land productivity, and forestry management.

Geology / Soils ^{/10}

The major types of soils within the watershed are Alfisols and Mollisols. The bedrock geology consists of primarily Precambrian crystalline rocks and Cretaceous era rocks, and Precambrian and Paleozoic sedimentary rocks (Sims and Morey, 1972, Stark et al, 1996).

The Watershed lies within calcareous glacial deposits characterized by the Des Moines Lobe Association. The bedrock hydrogeology and ground water in Watershed consists of primarily Precambrian igneous and metamorphic rocks with Cretaceous rocks.

The watershed area aquifers include Cretaceous and parts of the Mt. Simon-Hinckley-Fond Du Lac Aquifers. The surficial aquifers are primarily glacial outwash consisting of coarse-grained sands and fine-grained alluvium of calcareous and siliceous deposits and glacial till consisting of calcareous and siliceous deposits. Parts of the watershed area are also located in the surficial aquifer known as the Anoka Sand Plain.

Visit the online Web Soil Survey at
<http://websoilsurvey.nrcs.usda.gov> for official and
 current USDA soil information as viewable maps and
 tables. Visit the Soil Data Mart at
<http://soildatamart.usda.gov> to download SSURGO
 certified soil tabular and spatial data.

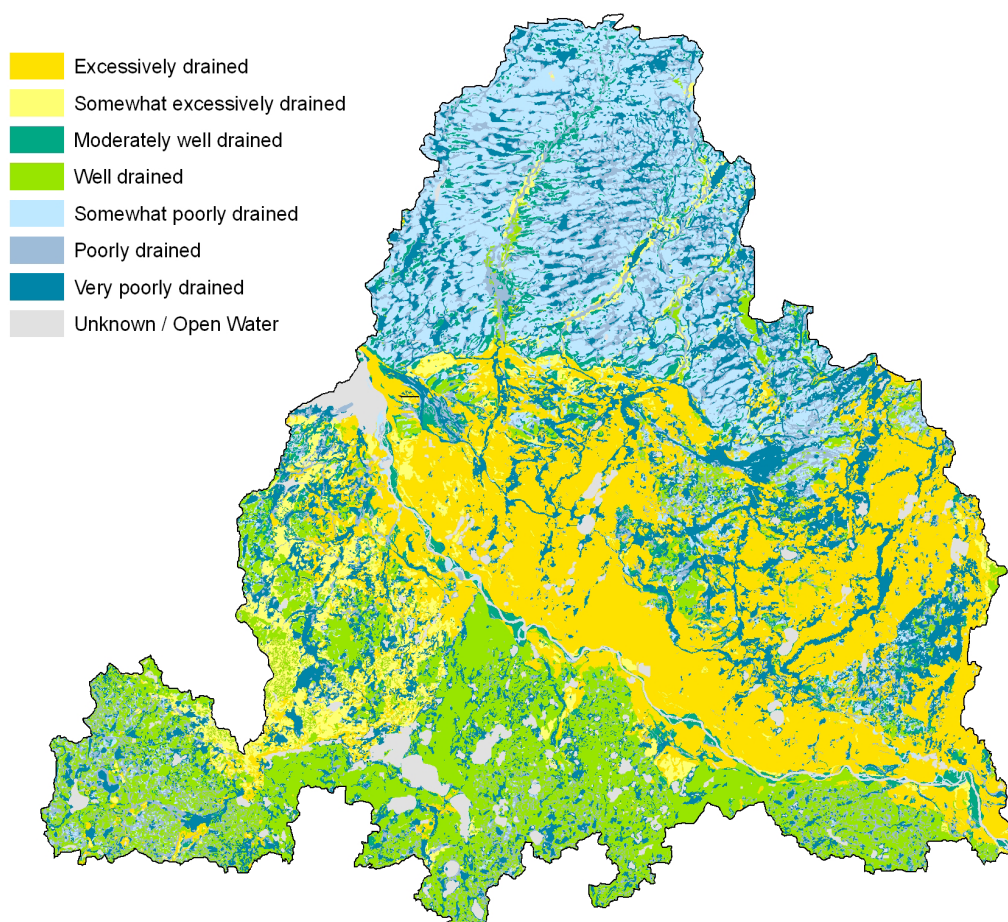
Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



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Farmland Classification

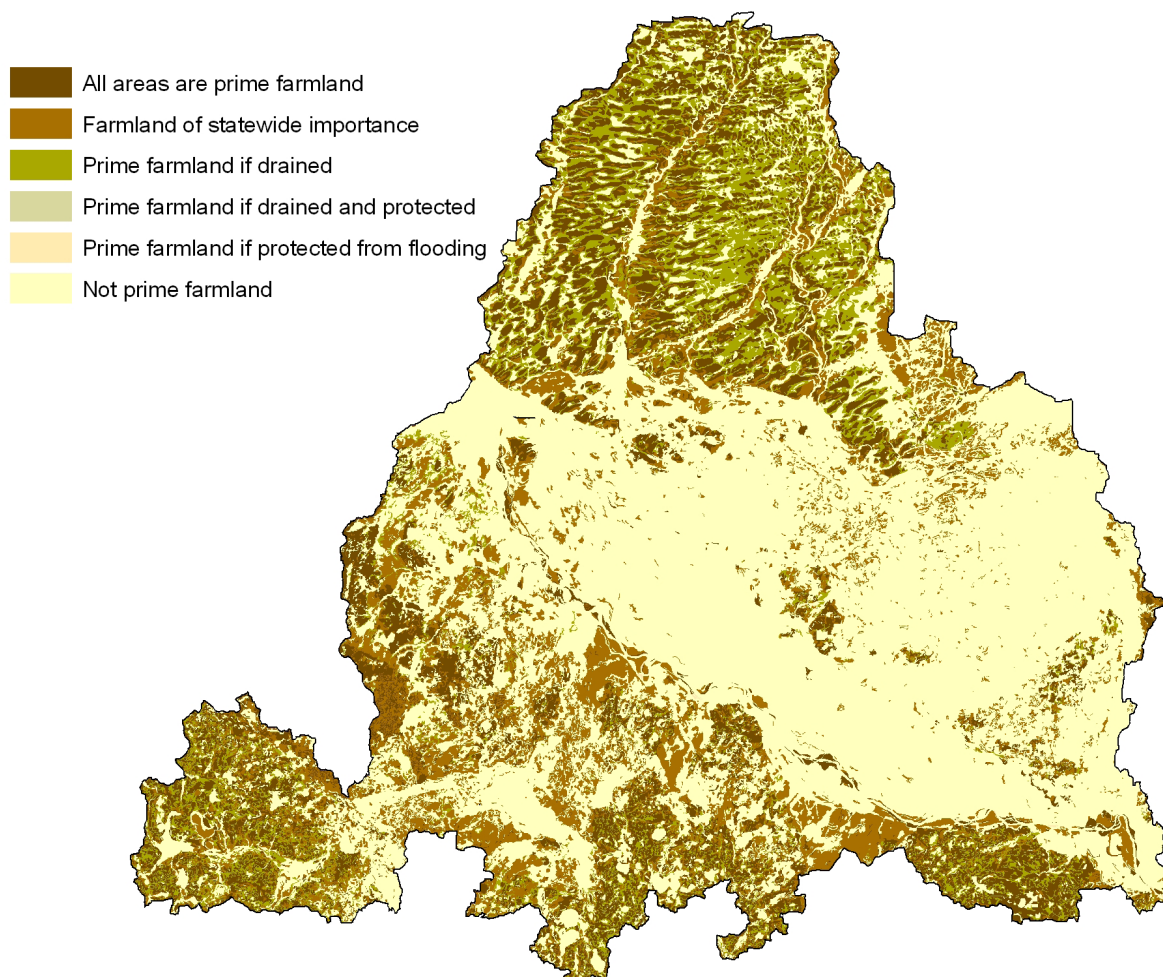
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.



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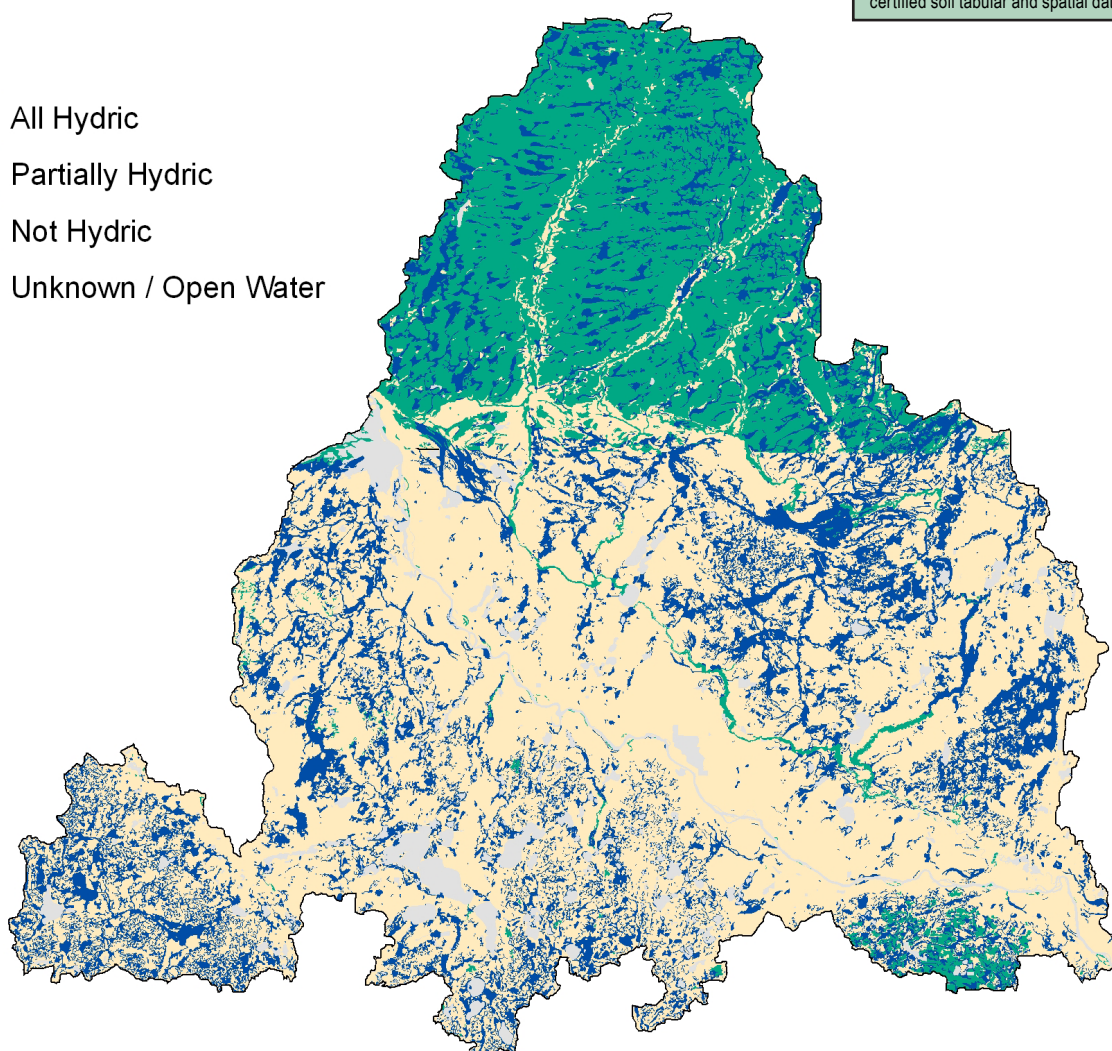
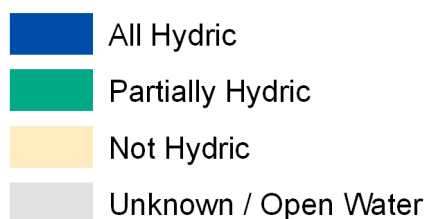
Hydric Soils

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of nonhydric soils in the higher positions on the landform. Map units of dominantly non-hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



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Land Capability Classification

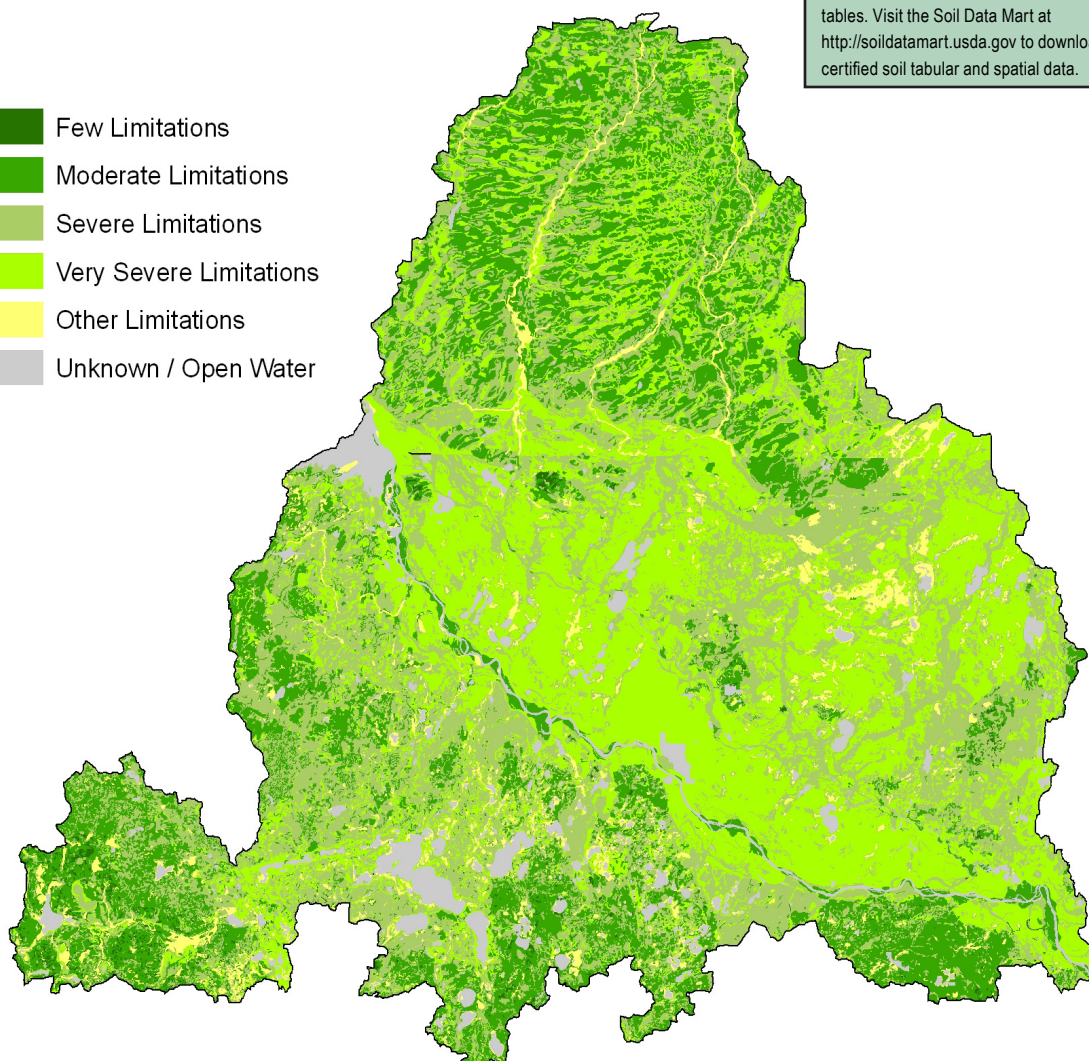
Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



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-  Few Limitations
-  Moderate Limitations
-  Severe Limitations
-  Very Severe Limitations
-  Other Limitations
-  Unknown / Open Water



Performance Results System Data

Watershed Name: Clearwater - Elk				Watershed Number: 07010203						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	1,480	6,205	0	947	2,553	N/A	6,669	12,171	4,809	34,834
Total Conservation Systems Applied (acres)	5,459	5,781	0	1,734	1,734	N/A	7,737	11,411	7,512	41,368
Conservation Practices										
Total Waste Management (313) (numbers)	2	1	0	0	0	0	0	0	0	3
Riparian Forest Buffers (391) (acres)	72	63	82	212	132	19	21	0	0	601
Erosion Control Total Soil Saved (tons/year)	3,252	77,123	31,511	15,875	10,011	N/A	N/A	N/A	N/A	137,772
Total Nutrient Management (590) (Acres)	1,734	2,793	3,167	676	1,360	76	2,271	2,271	1,742	16,090
Pest Management Systems Applied (595A) (Acres)	445	625	480	39	78	0	1,034	1,014	1,369	5,084
Prescribed Grazing 528a (acres)	54	0	0	130	0	199	9	64	64	520
Tree & Shrub Establishment (612) (acres)	104	197	229	265	163	227	57	187	172	1,601
Residue Management (329A-C) (acres)	2,502	2,067	1,917	690	518	446	446	3,994	1,607	14,187
Total Wildlife Habitat (644 - 645) (acres)	1,334	2,711	1,448	1,568	2,370	854	1,568	2,147	2,892	16,892
Total Wetlands Created, Restored, or Enhanced (acres)	5	17	57	114	20	78	22	28	136	477
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	5,378	2,846	2,026	1,302	744	N/A	640	1,339	1,275	15,550
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	2,622	3,465	3,310	117	1,595	N/A	4,439	5,779	4,975	26,302
Wildlife Habitat Incentive Program	3,845	16	0	40	67	N/A	0	101	0	4,069
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

THREATENED AND ENDANGERED SPECIES ^{/14}

Scientific Name	Common Name	Type
<i>Antennaria parvifolia</i>	Small-leaved Pussytoes	Botanical
<i>Aristida tuberculosa</i>	Sea-beach Needlegrass	Botanical
<i>Botrychium rugulosum</i>	St. Lawrence Grapefern	Botanical
<i>Buteo lineatus</i>	Red-shouldered Hawk	Zoological
<i>Cicindela patruela patruela</i>	Northern Barrens Tiger Beetle	Zoological
<i>Cirsium hillii</i>	Hill's Thistle	Botanical
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Botanical
<i>Dendroica cerulea</i>	Cerulean Warbler	Zoological
<i>Empidonax virescens</i>	Acadian Flycatcher	Zoological
<i>Emydoidea blandingii</i>	Blanding's Turtle	Zoological
<i>Etheostoma microperca</i>	Least Darter	Zoological
<i>Falco peregrinus</i>	Peregrine Falcon	Zoological
<i>Fimbristylis autumnalis</i>	Autumn Fimbristylis	Botanical
<i>Gallinula chloropus</i>	Common Moorhen	Zoological
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Hesperia uncas</i>	Uncas Skipper	Zoological
<i>Heterodon nasicus</i>	Western Hognose Snake	Zoological
<i>Hudsonia tomentosa</i>	Beach-heather	Botanical
<i>Juglans cinerea</i>	Butternut	Botanical
<i>Juniperus horizontalis</i>	Creeping Juniper	Botanical
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Zoological
<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Metaphidippus arizonensis</i>	A Jumping Spider	Zoological
<i>Microtus ochrogaster</i>	Prairie Vole	Zoological
<i>Minuartia dawsonensis</i>	Rock Sandwort	Botanical
<i>Myotis septentrionalis</i>	Northern Myotis	Zoological
<i>Notropis anogenus</i>	Pugnose Shiner	Zoological
<i>Panax quinquefolius</i>	American Ginseng	Botanical
<i>Perognathus flavescens</i>	Plains Pocket Mouse	Zoological
<i>Pipistrellus subflavus</i>	Eastern Pipistrelle	Zoological
<i>Pituophis catenifer</i>	Gopher Snake	Zoological
<i>Platanthera flava</i> var. <i>herbiola</i>	Tubercled Rein-orchid	Botanical
<i>Podiceps auritus</i>	Horned Grebe	Zoological
<i>Polygala cruciata</i>	Cross-leaved Milkwort	Botanical
<i>Ruppia maritima</i>	Widgeon-grass	Botanical
<i>Scleria triglomerata</i>	Tall Nut-rush	Botanical
<i>Shinnersoseris rostrata</i>	Annual Skeletonweed	Botanical
<i>Sterna forsteri</i>	Forster's Tern	Zoological
<i>Sterna hirundo</i>	Common Tern	Zoological

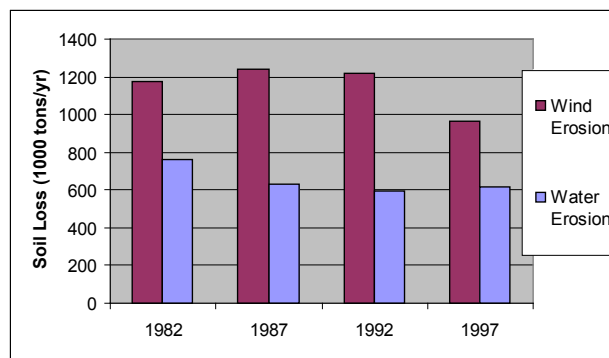
RESOURCE CONCERNS

County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- **Soil Quality, Surface Water Quality - Excessive Sheet & Rill Erosion.** Soil Erosion and Deposition has ranked as a top concern in each county in relation to both soil quality and surface water quality.
- **Animal Waste Management.** Managing farms to minimize excess nutrients, pathogens, and odors released into the environment is important to the health of surface and ground water. Setback of open tile intakes and placement of agricultural waste systems in high priority riparian areas and areas with coarse grained soils will greatly reduce the effects of animal feed operations on area waters.
- **Stormwater Management.** Local districts recognize that runoff volume will likely increase as development of the watershed continues. Districts seek to require that peak runoff rates be kept below the capacity of downstream conveyance facilities through the use of retention facilities.
- **Sediment and Erosion Control.** Working hand-in-hand with stormwater pollution and prevention plans, counties in the watershed seek to minimize disturbances and prevent adjacent properties and waterbodies from receiving sediment deposits
- **Groundwater Protection, Water quality.** County and watershed conservation groups seek to protect and improve groundwater quality throughout the subbasin. Aging septic systems, abandoned wells, and historical tiling practices all threaten public drinking water supplies. County planners require septic upgrades upon the sale of houses or before structural additions in the district, SWCDs in the area offer low interest loans to individuals seeking to upgrade their On-site septic systems.
- **Wildlife Habitat.** Given the fragmentation caused by agricultural practices and increased shoreland development, natural corridors of natural habitat for wildlife are decreasing. A need exists to improve or establish both wetland and upland habitat throughout the watershed.
- **Wetland Management.** Due to agricultural practices and documented development pressures within shoreland areas, priority is given to preserving the wetlands within 1000 feet of a lake or 300 feet of a river. Restoration of wetlands, dam repair and placing flood-prone lands in CRP/RIM all serve to lessen the impact of flooding and sedimentation, and improve drainage.
- **Ground Water Quantity.** Land alterations have transformed the flow, retention, and replenishment of the hydrologic cycle. Pattern tiling, ditching, wetland removal, development, stormwater drainage, excessive groundwater use, etc. have resulted in the cumulative effect of rapidly transporting a greater amount of water to major rivers and streams, and away from groundwater recharge potential.

NRI Erosion Estimates

- Sheet and rill erosion by water on the cropland and pastureland decreased by approximately 144,000 tons (18.94%) of soil between 1982 and 1997.
- NRI estimates indicate wind erosion rates decreased by 208,700 tons (17.8%) between 1982 and 1997.



Socioeconomic and Agricultural Data (Relevant)

Estimations for the Clearwater-Elk subbasin indicate a current population of 160,680 people. Median household income throughout the district is approximately \$47,111 annually, roughly 102% of the national average. Unemployment is estimated at 4.7%, and approximately 7% of the residents in the watershed are below the national poverty level.

Assessment estimates indicate 2,250 Farms in the watershed. Approximately forty nine percent of the operations are less than 180 acres in size, forty seven percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Of the 2,287 Operators in the basin, fifty eight percent are full-time producers not reliant on off-farm income.



(MN) HUC# 7010203		Total Acres:	717,785
Population Data *	Watershed Population	160,680	
	Unemployment Rate	4.7%	
	Median Household Income	47,111	
	% below poverty level	7%	
	Median Value of Home	111,338	
Farms	# of Farms	2,250	
	# of Operators	2,287	Percent
	# of Full Time Operators	1,320	58%
	# of Part Time Operators	967	42%
	Total Crop/Pasturelands:	352,600	49.1%
Farm Size	1 to 179 Acres	1,103	49%
	180 to 499 Acres	855	38%
	500 to 999 Acres	203	9%
	1,000 Acres or more	90	4%
Livestock & Poultry	Cattle - Beef	7,349	1%
	Cattle - Dairy	21,042	2%
	Chicken	127,783	14%
	Swine	40,295	4%
	Turkey	253,530	28%
	Other	456,363	50%
	Animal Count Total:	906,362	
Chemicals (Acres Applied)	Total Permitted AFOs:	1,456	
	Insecticides	35,688	
	Herbicides	280,822	
	Wormicides	5,688	
	Fruiticides	182	
	Total Acres Treated	322,380	
	% State Chemical Totals	2.3%	

* Adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available

Watershed Projects, Plans and Monitoring

- | | |
|---|--|
| <ul style="list-style-type: none"> • Upper Watkins Wetland Isolation Project
Clearwater River Watershed District • Watkins Stormwater Quality Improvement Project
Clearwater River Watershed District • Nistler Sediment Basin Expansion Project
Clearwater River Watershed District • Agricultural Land Buffer Incentive Program
Minnesota Department of Agriculture • Lakescaping Incentive Policy and Program
MN DNR, MPCA, CRWD. • Mississippi River Env. Management Program
US Army Corps of Engineers | <ul style="list-style-type: none"> • Mississippi River Defense Network
Legislative Commission on Minnesota Resources • Mississippi River Watch
Mississippi Headwaters Board • Upper Mississippi River Basin Planning
Minnesota Pollution Control Agency • Upper Mississippi Source Water Protection Project
Minnesota Department of Health • Upper Mississippi River WS Forest Partnership
USDA Forest Service • Upper Mississippi River Watershed Fund
USDA Forest Service / National Fish & Wildlife Federation • Upper Mississippi River Basin W.Q. Plan
Minnesota Pollution Control Agency |
|---|--|
- * Have a watershed project you'd like to see included?
- Submit suggestions @ <http://www.mn.nrcs.usda.gov/technical/rwa/>

Conservation Districts, Organizations & Partners

- | | |
|---|---|
| <ul style="list-style-type: none"> • Benton County SWCD
14 Second Ave W, Foley, MN 56329
Phone (320) 968-5300 • Hennepin County SWCD
1313 5th St SE Ste 224C, Minneapolis, MN 55414
Phone (612) 379-3932 • Meeker County SWCD
916 E St Paul St, Litchfield, MN 55355-0891
Phone (320) 693-7287 • Mille Lacs County SWCD
900 Hwy 23 W, Milaca, MN 56353
Phone (320) 983-2160 • Morrison County SWCD
16776 Heron Rd, Little Falls, MN 56345
Phone (320) 616-2479 • Sherburne County SWCD
14855 Hwy 10, Elk River, MN 55330
Phone (763) 241-1170 | <ul style="list-style-type: none"> • Stearns County SWCD
110 Second St S Ste 128, Waite Park, MN 56387
Phone (320) 251-7800 • Wright County SWCD
306 C Brighton Ave, Buffalo, MN 55313
Phone (763) 682-1970 • Clearwater River Watershed District
Box 481, Annandale MN 55302
Phone (320) 274-3935 • Friends of the Mississippi River
360 N Robert St Saint Paul, MN 55101
Phone (651) 222-2193 • Crow River Org. of Water (Joint Powers Board)
306c Brighton Avenue Buffalo, MN 55113
Phone (763) 682-1933 ext. 3 • Trout Unlimited Twin Cities Chapter
PO Box 390207
Edina, MN 55439-0207 |
|---|---|

Footnotes / Bibliography

1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildlife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is variable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.
3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff. Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.
4. U.S. Geological Survey National Hydrography Dataset (NHD) 1:100,000-scale Digital Line Graph (DLG) medium resolution hydrography data, integrated with reach-related information from the U.S. Environmental Protection Agency Reach File Version 3.0 (RF3). The Hydro 100k layer was compared to MPCA's 303(d) data to derive percentage of listed waters.
5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.
6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
7. 2002 NASS Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. For more information: <http://www.agcensus.usda.gov/>
8. 303(d) Stream data. Minnesota's Final Impaired Waters (per Section 303(d) Clean Water Act), 2006. Data obtained from Minnesota Pollution Control Agency (MPCA). The Minnesota Pollution Control Agency (MPCA) helps protect state water by monitoring quality, setting standards and controlling inputs through the development of TMDL plans. <http://www.pca.state.mn.us/water/tmdl/index.html#maps>.

Footnotes / Bibliography (continued)

9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at <http://soildatamart.nrcs.gov>. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Highly Erodible Land Classification Data obtained from USDA/NRCS EFOTG Section II, County Soil Data. HEL classifications were appended to SSURGO spatial data via an ARCEdit session. Addendum and publication dates vary by county. Bedrock Geology and Structure: Zumbro Watershed Partnership Management Plan, 9/30/2007.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm (7/30/04). CREP Acres: <http://www.bwsr.state.mn.us/easements/crep/easementssummary.html> (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Data were also taken from MPCA AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit <http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm>

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. <http://www.nrcs.usda.gov/Technical/efotg/>. Where listed, Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 <http://www.nmfs.noaa.gov/sfa/magact/>

15. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>. Additional Information on listed individual projects can be obtained from the noted parties.